

# Waller Creek Restoration & Rehabilitation Project

An Environmentally Responsive / Green Project



Kellogg Brown & Root Services, Inc.  
Espey Consultants, Inc.

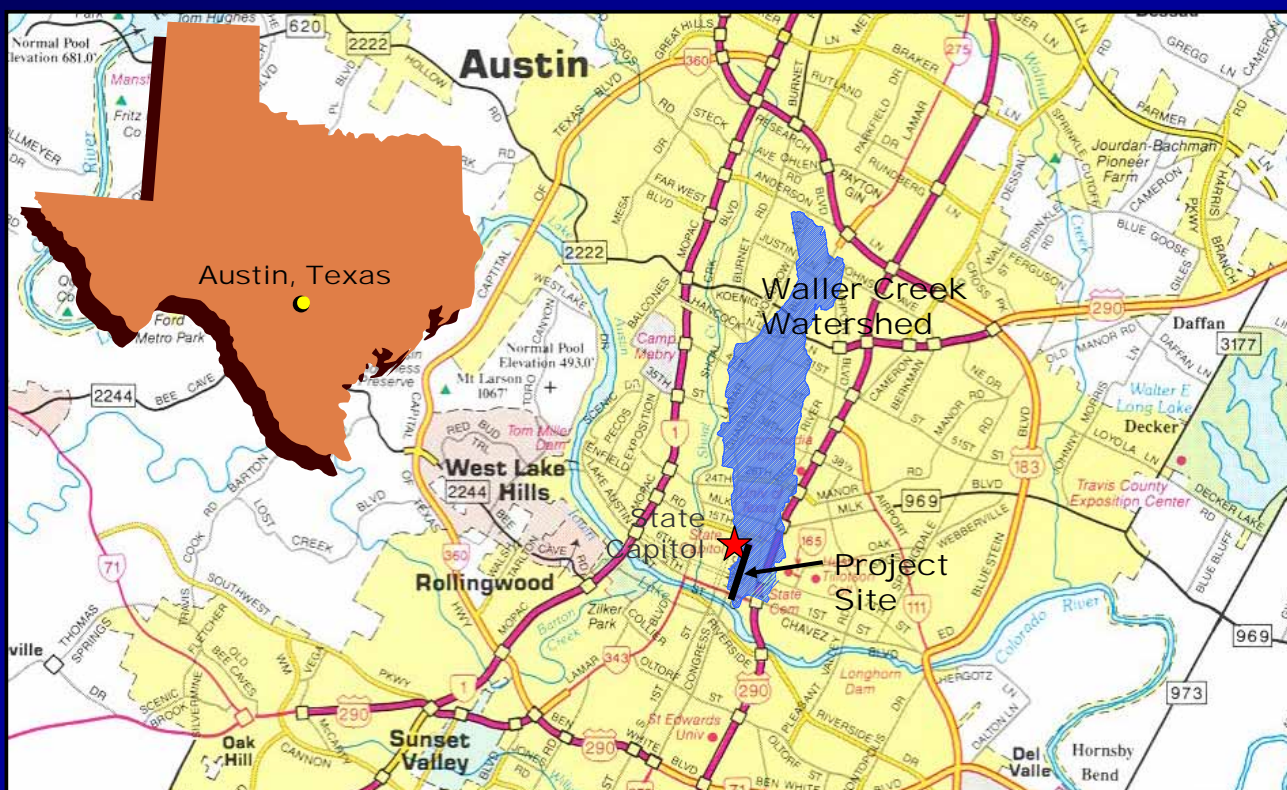
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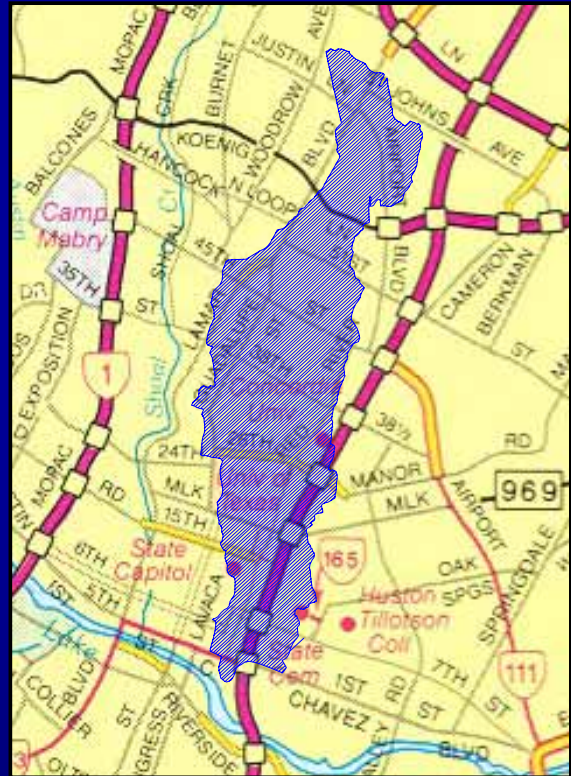
## Project Location



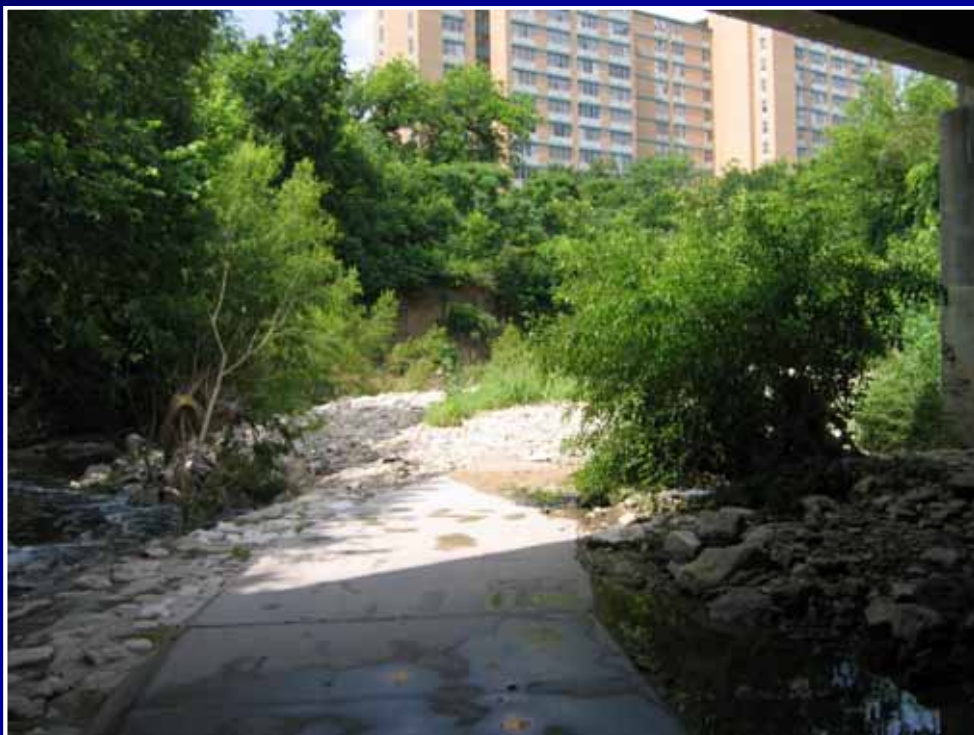


# Waller Creek Watershed

- Drainage Area = 3,700 acres (5.74 sq mi)
- Fully Developed with >50% Impervious Cover
- Water Quality: Lower than 70% of Austin-area Streams
- 43 Erosion Problem Sites identified in 2002



## Existing Erosion Conditions



# Flood History

## THEORETICAL STORM

- 100-year
  - 1% chance of occurrence in any given year
  - 10.2 inches in 24 hours (Travis County)



## HISTORICAL FLOODS

- 1915
  - 10 inches in 24 hours
- 1921
  - 13.75 inches in 12 hours
- 1981 Memorial Day flood (Shoal Creek)
  - 10 inches in 4 hours



# Existing Floodplain Conditions

## ■ **Flooding Impacts**

- 42 Structures & 12 Roadways in Floodplain
- 1,200,000 Sq Ft of Land is Undevelopable
- Reduced Property Values / Tax Revenue



# Proposed Solution

## ■ Project Elements

- Flood Control Tunnel
- Inlet & Pond at Waterloo Park [A]
- Outlet & Wetlands at Lady Bird Lake [B]
- Creek Side Inlets and Bank Stabilization
- Tunnel/Creek Recirculation System



# Tunnel Structure

## ■ Dimensions

- Approximately 5,400 feet in length
- Average diameter of 22 feet
- 60-70 feet underground

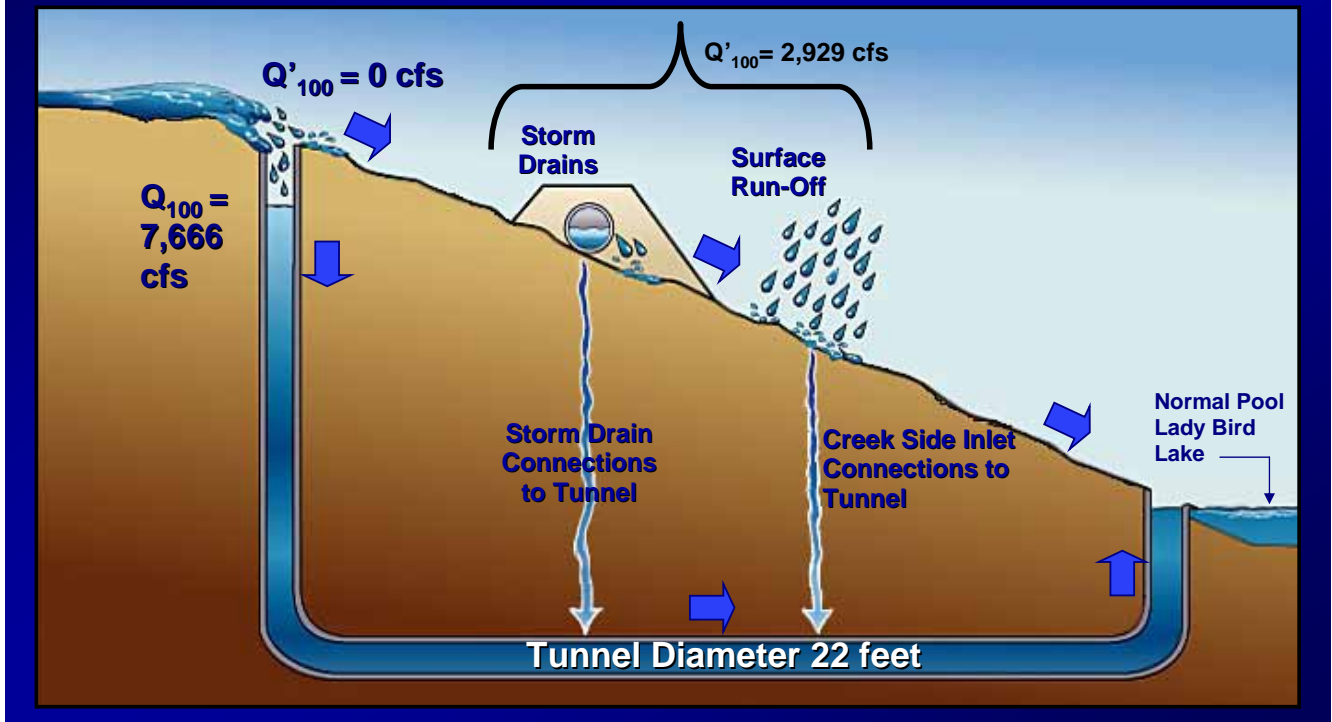
## ■ Surface features

- Inlet at Waterloo Park
- Outlet at Lady Bird Lake
- Creek Side Tunnel Inlets
- Creek recirculation





# Tunnel Profile



## Design Criteria

### ■ Engineering Requirements

- Hydraulic function
- Health and safety
- Minimize impacts / optimize benefits



### ■ Environmental / Sustainability Considerations

- Minimize Parkland Impacts
- Protect / Preserve Natural Features (exposed limestone creekbed, riparian habitat, natural vegetation, etc.)
- Identify Creek Restoration Opportunities



# Inlet (Waterloo Park)



## Inlet Components

- Creek Restoration
  - Approach channel
  - Lagoon / Wet Pond
- Water Quality
  - Debris screening & removal
  - Recirculation System
- Morning Glory Spillway
- In-channel Dam
- Minimal Impacts to Parkland



# Outlet (Lady Bird Lake)



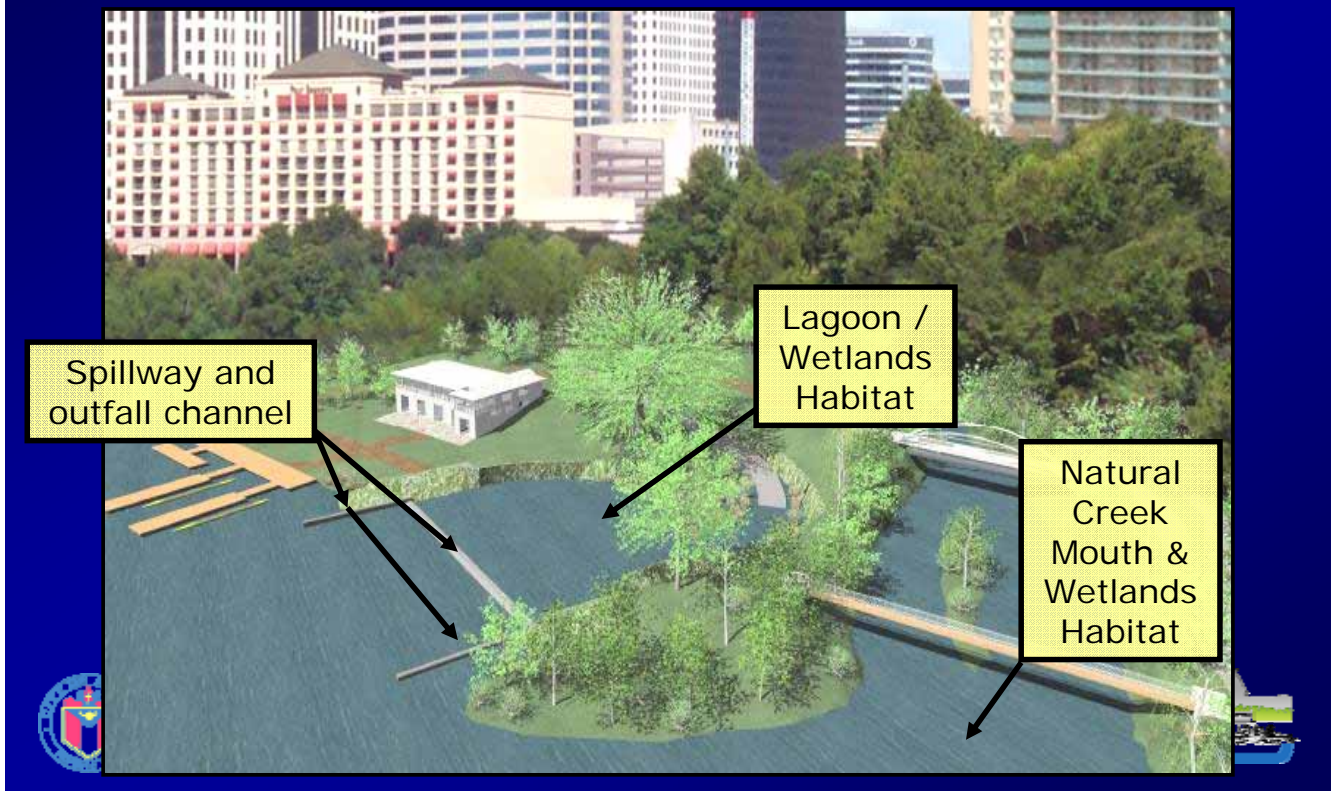
## Outlet Components

- Preserve Natural Creek Mouth & Wetlands Habitat at Lady Bird Lake
- Maintain Natural Shoreline
- New Lagoon / Wetlands Habitat
- Spillway & outfall channel





# Environmental Outlet Rendering



## Creek Side Tunnel Inlets





# Creek Side Tunnel Inlets

## ■ Site Selection

- Minimal impact to valuable natural features
  - Exposed geologic formations
  - Trees and natural vegetation
  - Potential riparian habitats
  - Historical structures
- Maximum potential for creek restoration
  - Existing man-made infrastructure within banks
  - Heavily eroded areas in need of rehabilitation
- Maximum floodplain reduction potential



## Creek Side Tunnel Inlets Existing Conditions



# Creek Side Tunnel Inlets

## Existing Conditions

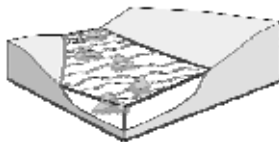
4<sup>th</sup> to 5<sup>th</sup> Street



# Creek Restoration

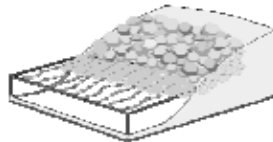
## ■ Design Considerations

### Boulder Clusters



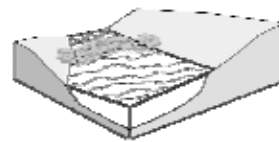
Groups of boulders placed in the lower flow channel to provide more varied water flows or areas of reduced velocity.

### Riprap



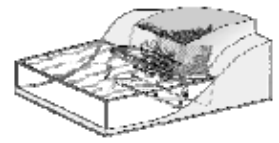
A blanket of appropriately sized stones covering the stream bed to provide a rougher surface for long-term durability.

### Weirs or Sills



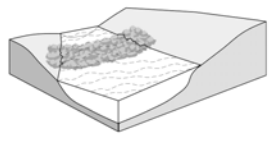
Long, low, flat, or stepped structures placed across the channel and anchored to the streambeds to either back up water pool habitat, control local erosion, or collect and move silt.

### Vegetated Gabions



Wire mesh, rectangular structures filled with soil and vegetation to stabilize the stream bank. They are placed in the stream bed to provide a rougher surface for long-term durability. They are also used to stabilize the stream bed.

### Grade Control Measures



Rock, wood, earth, and other material structures placed across the channel and anchored in the streambeds to provide a "hard point" in the streambed that resists the erosion forces of the degradational zone, and/or to reduce the upstream energy slope to prevent bed scour.

### Bank Shaping and Planting



Regrading streambanks to a stable slope, planting riparian and other vegetation to stabilize the streambed, and installing structures to stabilize streambeds and banks.



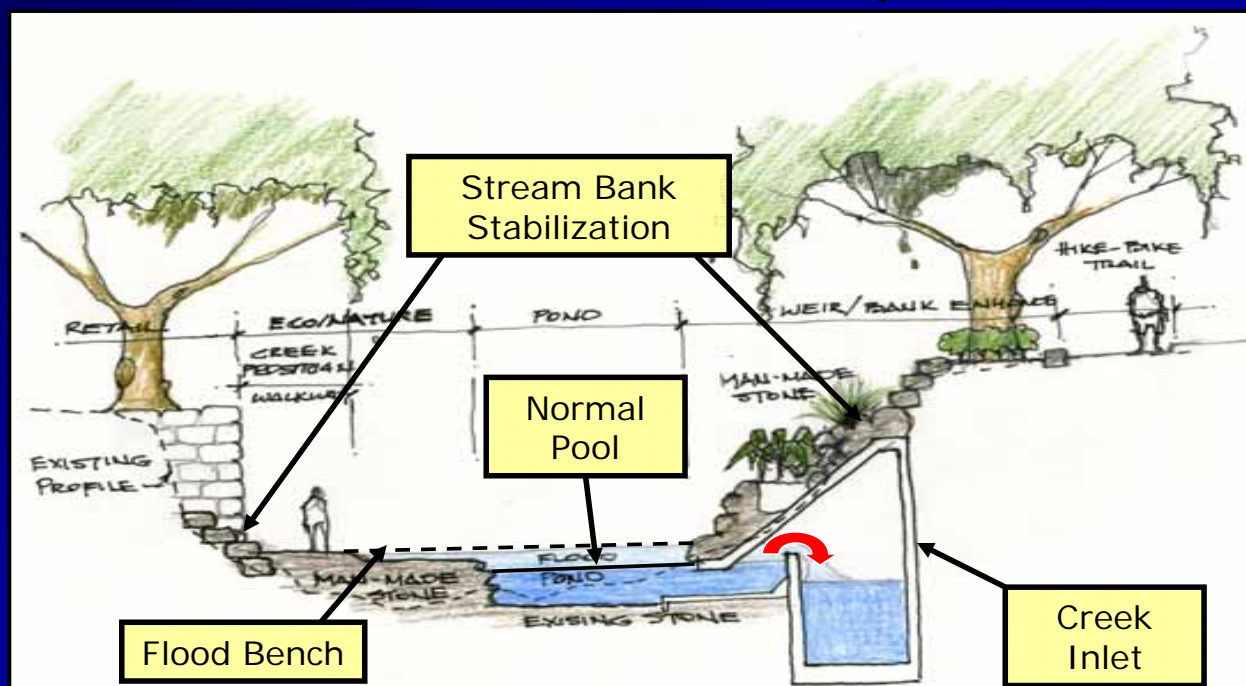


# Creek Restoration

## ■ Design Considerations



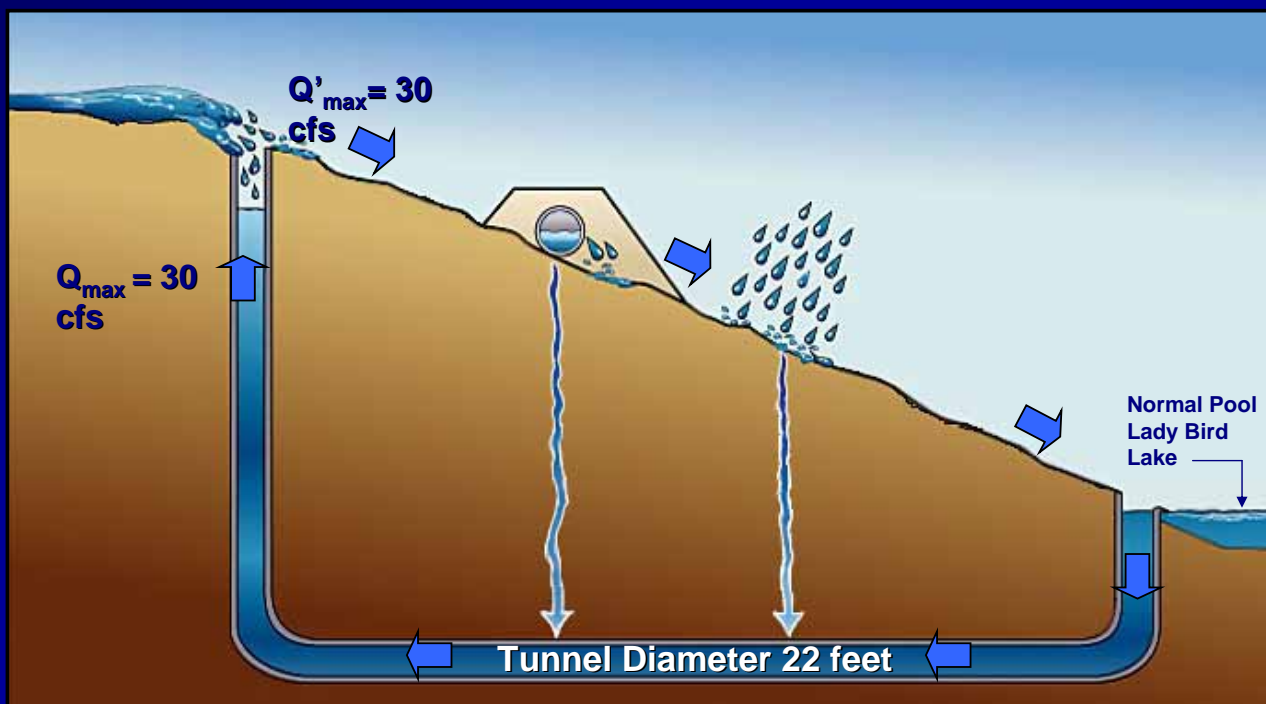
## Creek Side Inlet Components



# Environmental Creek Side Inlet Rendering



## Tunnel Recirculation





# Tunnel Recirculation

## ■ Water Quality Benefits

- Keep Tunnel Contents Fresh
- Keep Pool Contents Fresh
- Maintain Flow in Waller Creek
- Makeup Water for Water Features

## ■ Required Rate

- Dry Weather - 10 cfs to maintain 3+ mg/L DO
- Post Storm - 30 cfs to maintain 2+ mg/L DO

## ■ Recirculation Debris Screening

- Openings - 1 1/4 inch



# Project Benefits

## ■ Reduction of 100-year floodplain

- Over 1,000,000 square feet of land reclaimed
- 42 structures & 12 roadways reclaimed

## ■ Reduce risk of severe flooding and erosion

## ■ Stabilize and restore creek bed and banks

## ■ Substantial reduction of debris and pollutants

- Reduction of debris and constant water flow will improve overall water quality and conditions for plants and wildlife

## ■ Allow great opportunities for redevelopment and amenities along the creek, such as hike and bike trails

## ■ Natural channel design

## ■ Educational opportunities



